

What is claimed is:

1           1.    A method of establishing communications between a  
2 plurality of wireless devices including at least a first  
3 wireless device and a second wireless device, the method  
4 comprising the steps of:

5               (a)   scanning, by the first wireless device, a given  
6 frequency band for receiving a radio signal, comprising the  
7 steps of:

8                   (a1) measuring noise at a plurality of  
9 frequencies within the given frequency band;

10                   (a2) measuring signals at a plurality of  
11 frequencies within the given frequency band to determine  
12 whether any of the frequencies within the given frequency band  
13 is used by an existing communication link;

14                   (a3) determining available frequency channels  
15 within the given frequency band based upon the steps of  
16 measuring the noise and measuring the signals;

17               (b)   computing a spectral signature for the  
18 available frequency channels within the given frequency band;

19               (c)   establishing far-end communication parameters  
20 for the second wireless device; and

21               (d)   transmitting the far-end communication  
22 parameters to the second wireless device.

1           2.    The method of claim 1, further comprising the step  
2 of setting a plurality of frequency bands for scanning by the  
3 first wireless device.

1           3.    The method of claim 1, further comprising the step  
2 of initializing scan receiver parameters by the first wireless  
3 device prior to the step of scanning the given frequency band.

1           4.    The method of claim 3, wherein the step of  
2 initializing scan receiver parameters comprises the step of  
3 receiving at least one user configuration input.

1           5.    The method of claim 4, wherein said at least one  
2 user configuration input includes data speed and type of  
3 service.

1           6.    The method of claim 4, wherein the step of  
2 establishing far-end communication parameters comprises the  
3 step of comparing the spectral signature for the available  
4 frequency channels with said at least one user configuration  
5 input.

1           7.    The method of claim 1, wherein the step of measuring  
2 the noise comprises the steps of measuring a noise floor and  
3 measuring an average noise level over the given frequency  
4 band.

1        8. The method of claim 1, wherein the communication  
2 parameters include a map of the available frequency channels  
3 within the given frequency band.

1        9. The method of claim 8, wherein the communication  
2 parameters further include quality parameters.

1        10. The method of claim 9, wherein the quality  
2 parameters include a bit error rate (BER).

1        11. The method of claim 9, wherein the quality  
2 parameters include a correlation time.

1        12. The method of claim 9, wherein the quality  
2 parameters include block errors.

1        13. The method of claim 1, wherein the step of  
2 transmitting the communication parameters to the second  
3 wireless device comprises the step of transmitting a calling  
4 signal carrying the communication parameters over a given  
5 calling frequency.

1        14. The method of claim 13, wherein the step of  
2 transmitting the calling signal over the given calling  
3 frequency comprises the step of transmitting the calling  
4 signal with a high processing gain, the calling signal  
5 receivable by the second wireless device in a noisy  
6 environment.

1        15. The method of claim 1 for continually maintaining  
2 communications between the first wireless device and the  
3 second wireless device, comprising the steps of repeating  
4 steps (a)-(d) to transmit time-varying communication  
5 parameters from the first wireless device to the second  
6 wireless device.

1        16. The method of claim 1, further comprising the steps  
2 of:

3            (e) receiving, by the second wireless device, the  
4 communication parameters from the first wireless device;

5            (f) scanning, by the second wireless device, a  
6 given frequency band for receiving a radio signal, comprising  
7 the steps of:

8                    (f1) measuring noise at a plurality of  
9 frequencies within the given frequency band;

10                   (f2) measuring signals at a plurality of  
11 frequencies within the given frequency band to determine  
12 whether any of the frequencies within the given frequency band  
13 is used by an existing communication link;

14                   (f3) determining a second plurality of  
15 available frequency channels within the given frequency band  
16 based upon the steps of measuring the noise and measuring the  
17 signals;

18 (g) computing, by the second wireless device, a  
19 second spectral signature for the second plurality of  
20 available frequency channels within the given frequency band;

21 (h) establishing, by the second wireless device, a  
22 second plurality of far-end communication parameters for the  
23 first wireless device; and

24 (i) transmitting, by the second wireless device,  
25 the second plurality of far-end communication parameters to  
26 the first wireless device.

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17. The method of claim 16 for continually maintaining  
communications between the first wireless device and the  
second wireless device, comprising the steps of repeating  
steps (e)-(i) to exchange time-varying communication  
parameters between the first wireless device and the second  
wireless device.

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18. The method of claim 17, wherein the communication  
parameters are exchanged between the first wireless device and  
the second wireless device as link level data.

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19. The method of claim 1 for establishing  
communications between the first wireless device and a third  
wireless device, further comprising the steps of:

4 (e) scanning, by the first wireless device, a given  
5 frequency band for receiving a radio signal, comprising the  
6 steps of:

7 (e1) measuring noise at a plurality of  
8 frequencies within the given frequency band;

9 (e2) measuring signals at a plurality of  
10 frequencies within the given frequency band to determine  
11 whether any of the frequencies within the given frequency band  
12 is used by an existing communication link;

13 (e3) determining available frequency channels  
14 for the third wireless device within the given frequency band  
15 based upon the steps of measuring the noise and measuring the  
16 signals;

17 (f) computing a spectral signature for the  
18 available frequency channels for the third wireless device  
19 within the given frequency band;

20 (g) establishing far-end communication parameters  
21 for the third wireless device; and

22 (h) transmitting the far-end communication  
23 parameters to the third wireless device.

1 20. A method of establishing communications between a  
2 plurality of wireless devices including at least a first  
3 wireless device and a second wireless device, the method  
4 comprising the steps of:

5 (a) scanning, by the first wireless device, a given  
6 frequency band for receiving a radio signal, comprising the  
7 steps of:

8 (a1) measuring noise at a plurality of  
9 frequencies within the given frequency band;

10 (a2) measuring signals at a plurality of  
11 frequencies within the given frequency band to determine  
12 whether any of the frequencies within the given frequency band  
13 is used by an existing communication link;

14 (a3) determining a first plurality of available  
15 frequency channels within the given frequency band based upon  
16 the steps of measuring the noise and measuring the signals;

17 (b) computing, by the first wireless device, a  
18 first spectral signature for the first plurality of available  
19 frequency channels within the given frequency band;

20 (c) establishing, by the first wireless device, a  
21 first plurality of far-end communication parameters for the  
22 second wireless device;

23 (d) transmitting, by the first wireless device, the  
24 first plurality of far-end communication parameters to the  
25 second wireless device;

26 (e) receiving, by the second wireless device, the  
27 first plurality of far-end communication parameters from the  
28 first wireless device;

29 (f) scanning, by the second wireless device, a  
30 given frequency band for receiving a radio signal, comprising  
31 the steps of:

32 (f1) measuring noise at a plurality of  
33 frequencies within the given frequency band;

34 (f2) measuring signals at a plurality of  
35 frequencies within the given frequency band to determine  
36 whether any of the frequencies within the given frequency band  
37 is used by an existing communication link;

38 (f3) determining a second plurality of  
39 available frequency channels within the given frequency band  
40 based upon the steps of measuring the noise and measuring the  
41 signals;

42 (g) computing, by the second wireless device, a  
43 second spectral signature for the second plurality of  
44 available frequency channels within the given frequency band;

45 (h) establishing, by the second wireless device, a  
46 second plurality of far-end communication parameters for the  
47 first wireless device; and

48 (i) transmitting, by the second wireless device,  
49 the second plurality of far-end communication parameters to  
50 the first wireless device.

1 21. The method of claim 20, further comprising the step  
2 of setting a plurality of frequency bands for scanning by the  
3 first wireless device.

1 22. The method of claim 20, further comprising the step  
2 of initializing scan receiver parameters by the first wireless  
3 device prior to the step of scanning the given frequency band  
4 by the first wireless device.



1        23. The method of claim 22, wherein the step of  
2        initializing scan receiver parameters by the first wireless  
3        device comprises the step of receiving at least one user  
4        configuration input by the first wireless device.

1        24. The method of claim 23, wherein said at least one  
2        user configuration input includes data speed and type of  
3        service.

1        25. The method of claim 23, wherein the step of  
2        establishing the first plurality of far-end communication  
3        parameters by the first wireless device comprises the step of  
4        comparing the first spectral signature for the first plurality  
5        of available frequency channels with said at least one user  
6        configuration input.

1        26. The method of claim 20, wherein the step of  
2        measuring the noise by the first wireless device comprises the  
3        steps of measuring a noise floor and measuring an average  
4        noise level over the given frequency band by the first  
5        wireless device, and wherein the step of measuring the noise  
6        by the second wireless device comprises the steps of measuring  
7        a noise floor and measuring an average noise level over the  
8        given frequency band by the second wireless device.

1        27. The method of claim 20, wherein the communication  
2        parameters for the first and second wireless devices include

3 first and second maps of the available frequency channels  
4 within the given frequency band, respectively.

1 28. The method of claim 27, wherein the communication  
2 parameters further include quality parameters.

1 29. The method of claim 28, wherein the quality  
2 parameters include a bit error rate (BER).

3 30. The method of claim 28, wherein the quality  
4 parameters include a correlation time.

1 31. The method of claim 28, wherein the quality  
2 parameters include block errors.

1 32. The method of claim 20, wherein the step of  
2 transmitting the first plurality of communication parameters  
3 by the first wireless device to the second wireless device  
4 comprises the step of transmitting a first calling signal  
5 carrying the first plurality of communication parameters over  
6 a first calling frequency, and wherein the step of  
7 transmitting the second plurality of communication parameters  
8 by the second wireless device to the first wireless device  
9 comprises the step of transmitting a second calling signal  
10 carrying the second plurality of communication parameters over  
11 a second calling frequency.

1 33. The method of claim 20 for continually maintaining  
2 communications between the first wireless device and the

3 second wireless device, comprising the steps of repeating  
4 steps (a)-(i) to exchange time-varying communication  
5 parameters between the first wireless device and the second  
6 wireless device.

1 34. The method of claim 20, wherein the communication  
2 parameters are exchanged between the first wireless device and  
3 the second wireless device as link level data.

1 35. The method of claim 20 for establishing  
2 communications between the first wireless device and a third  
3 wireless device, further comprising the steps of:

4 (j) scanning, by the first wireless device, a given  
5 frequency band for receiving a radio signal, comprising the  
6 steps of:

7 (j1) measuring noise at a plurality of  
8 frequencies within the given frequency band;

9 (j2) measuring signals at a plurality of  
10 frequencies within the given frequency band to determine  
11 whether any of the frequencies within the given frequency band  
12 is used by an existing communication link;

13 (j3) determining available frequency channels  
14 for the third wireless device within the given frequency band  
15 based upon the steps of measuring the noise and measuring the  
16 signals;

17           (k) computing, by the first wireless device, a  
18 spectral signature for the available frequency channels for  
19 the third wireless device within the given frequency band;

20           (l) establishing, by the first wireless device,  
21 far-end communication parameters for the third wireless  
22 device; and

23           (m) transmitting, by the first wireless device, the  
24 far-end communication parameters to the third wireless device.

1           36. A method of establishing communications between a  
2 plurality of wireless devices including at least a first  
3 wireless device and a second wireless device, the method  
4 comprising the steps of:

5           (a) setting a plurality of frequency bands for  
6 scanning by the first wireless device;

7           (b) initializing scan receiver parameters by the  
8 first wireless device;

9           (c) scanning, by the first wireless device, a given  
10 frequency band for receiving a radio signal, comprising the  
11 steps of:

12           (c1) measuring noise at a plurality of  
13 frequencies within the given frequency band;

14           (c2) measuring signals at a plurality of  
15 frequencies within the given frequency band to determine  
16 whether any of the frequencies within the given frequency band  
17 is used by an existing communication link;

18 (c3) determining a first plurality of available  
19 frequency channels within the given frequency band based upon  
20 the steps of measuring the noise and measuring the signals;

21 (d) computing, by the first wireless device, a  
22 first spectral signature for the first plurality of available  
23 frequency channels within the given frequency band;

24 (e) establishing, by the first wireless device, a  
25 first plurality of far-end communication parameters for the  
26 second wireless device;

27 (f) transmitting, by the first wireless device, the  
28 first plurality of far-end communication parameters to the  
29 second wireless device;

30 (g) receiving, by the second wireless device, the  
31 first plurality of far-end communication parameters from the  
32 first wireless device;

33 (h) scanning, by the second wireless device, a  
34 given frequency band for receiving a radio signal, comprising  
35 the steps of:

36 (h1) measuring noise at a plurality of  
37 frequencies within the given frequency band;

38 (h2) measuring signals at a plurality of  
39 frequencies within the given frequency band to determine  
40 whether any of the frequencies within the given frequency band  
41 is used by an existing communication link;

42 (h3) determining a second plurality of  
43 available frequency channels within the given frequency band

44 based upon the steps of measuring the noise and measuring the  
45 signals;

46 (i) computing, by the second wireless device, a  
47 second spectral signature for the second plurality of  
48 available frequency channels within the given frequency band;

49 (j) establishing, by the second wireless device, a  
50 second plurality of far-end communication parameters for the  
51 first wireless device;

52 (k) transmitting, by the second wireless device,  
53 the second plurality of far-end communication parameters to  
54 the first wireless device; and

55 (l) continually maintaining communications between  
56 the first wireless device and the second wireless device,  
57 comprising the steps of:

58 repeating steps (c)-(f) to transmit time-  
59 varying communication parameters from the first wireless  
60 device to the second wireless device; and

61 repeating steps (h)-(k) to transmit time-  
62 varying communication parameters from the second wireless  
63 device to the first wireless device.

1 37. The method of claim 36, wherein the step of  
2 initializing scan receiver parameters by the first wireless  
3 device comprises the step of receiving at least one user  
4 configuration input by the first wireless device.

5           38. The method of claim 37, wherein said at least one  
6 user configuration input includes data speed and type of  
7 service.

1        39. The method of claim 37, wherein the step of  
2        establishing the first plurality of far-end communication  
3        parameters by the first wireless device comprises the step of  
4        comparing the first spectral signature for the first plurality  
5        of available frequency channels with said at least one user  
6        configuration input.

40. The method of claim 36, wherein the step of measuring the noise by the first wireless device comprises the steps of measuring a noise floor and measuring an average noise level over the given frequency band by the first wireless device, and wherein the step of measuring the noise by the second wireless device comprises the steps of measuring a noise floor and measuring an average noise level over the given frequency band by the second wireless device.

41. The method of claim 36, wherein the communication parameters for the first and second wireless devices include first and second maps of the available frequency channels within the given frequency band, respectively.

1        42. The method of claim 41, wherein the communication  
2        parameters further include quality parameters.

1        43. The method of claim 42, wherein the quality  
2 parameters include a bit error rate (BER).

1        44. The method of claim 42, wherein the quality  
2 parameters include a correlation time.

1        45. The method of claim 42, wherein the quality  
2 parameters include block errors.

1        46. The method of claim 36, wherein the step of  
2 transmitting the first plurality of communication parameters  
3 by the first wireless device to the second wireless device  
4 comprises the step of transmitting a first calling signal  
5 carrying the first plurality of communication parameters over  
6 a first calling frequency, and wherein the step of  
7 transmitting the second plurality of communication parameters  
8 by the second wireless device to the first wireless device  
9 comprises the step of transmitting a second calling signal  
10 carrying the second plurality of communication parameters over  
11 a second calling frequency.

1        47. The method of claim 36, wherein the communication  
2 parameters are exchanged between the first wireless device and  
3 the second wireless device as link level data.

1        48. The method of claim 36 for establishing  
2 communications between the first wireless device and a third  
3 wireless device, further comprising the steps of:



4           (m) scanning, by the first wireless device, a given  
5 frequency band for receiving a radio signal, comprising the  
6 steps of:

7                   (m1) measuring noise at a plurality of  
8 frequencies within the given frequency band;

9                   (m2) measuring signals at a plurality of  
10 frequencies within the given frequency band to determine  
11 whether any of the frequencies within the given frequency band  
12 is used by an existing communication link;

13                   (m3) determining available frequency channels  
14 for the third wireless device within the given frequency band  
15 based upon the steps of measuring the noise and measuring the  
16 signals;

17           (n) computing, by the first wireless device, a  
18 spectral signature for the available frequency channels for  
19 the third wireless device within the given frequency band;

20           (o) establishing, by the first wireless device,  
21 far-end communication parameters for the third wireless  
22 device; and

23           (p) transmitting, by the first wireless device, the  
24 far-end communication parameters to the third wireless device.